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Via Facsimile & U.S. Mail
CAY0999/340 WBS 48

September 17, 1999

Mr. Gerald J. Thibeault
Executive Officer
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

**Subject: Quarterly Report(s) – March through August 1999
Cleanup and Abatement Order No. 97-58
Order Item 1
Lockheed Martin Corporation**

Dear Mr. Thibeault:

This Report is for two quarters including the months of March, April, & May and June, July, & August 1999. The report is submitted in accordance with Board Order No. 97-58 and the approved (August 15, 1997) work plan.

1.0 Perchlorate Sampling

Technical data on perchlorate, associated with the regular Water Supply Contingency Policy sampling, was submitted to the RWQCB under separate cover for data collected in February, March, April, May and June 1999. The reports are entitled, "Production Well Sampling Report, Water Supply Contingency Plan, Crafton-Redlands Plume Project."

2.0 Modeling of Perchlorate Migration and Potential Impacts

Work continues on updating prior forecasts of perchlorate plume movement. For example, updated projections of future production (flow) for new and existing Bunker Hill Basin wells are being incorporated into the model forward simulations.

3.0 Treatment Technology Applicability Review

This update presents recent developments in perchlorate treatment technology research.

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3.1 Perchlorate Treatment Technology Update

This update is divided into two parts: on-going research efforts sponsored by Lockheed Martin, and highlights of research efforts by other groups such as technology companies, public agencies and universities.

3.1.1 Testing Sponsored by Lockheed Martin

Lockheed Martin is continuing to conduct research on various ion exchange process options. This research includes on-going and planned field tests of ion exchange resins.

Lockheed Martin completed an initial phase of resin testing to determine the selectivity and adsorptive capacity of the resins for perchlorate. The scope of the study included laboratory screening of several resins, followed by small-scale field testing of two resins using groundwater from Sacramento, California. Both resins tested in the field were selective towards perchlorate removal. Initial test results indicate that these resins are capable of removing perchlorate to below the detection limit in the presence of other competing anions. Further research is required to determine if these resins can be effectively regenerated. Lockheed Martin is continuing bench scale testing on potential regeneration methods for these resins.

Lockheed Martin is proposing to pilot test ion exchange systems at the Gage New 6 well, located in the Gage well field. The scope and duration of the pilot tests are currently being developed.

3.1.2 Testing Sponsored by Other Groups

Pilot Tests of the Calgon ISEP System

Calgon has completed two small-scale pilot tests of its ISEP ("Ion Separation") system in Southern California for treatment of perchlorate. The first pilot test was sponsored by the Main San Gabriel Watermaster and was conducted at the Big Dalton well. The results of this pilot test were presented at the AWWA Perchlorate Conference held in Ontario, California on March 18th and 19th. Test results show that the perchlorate was removed to non-detectable levels (i.e., less than 4 parts per billion, ppb) in groundwater with a perchlorate concentration of 18 to 76 ppb.

Calgon recently completed its' pilot test sponsored by the Jet Propulsion Laboratory in Pasadena, California. The report was issued on June 28, 1999, and results were presented at a meeting held by the Main San Gabriel Basin Watermaster on July 27, 1999.

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Calgon has announced a contract with the La Puente Valley County Water District to install a 2,500 gpm ISEP system to remove perchlorate from a water supply well with 50 ppb to 100 ppb perchlorate concentrations. Treated water from the full-scale system will be discharged to spreading basins for an extended period of time until the Department of Health Services decides whether to grant a permit that might allow the treated water to be distributed into a drinking water system.

Fixed Bed Ion Exchange Testing Sponsored by the Main San Gabriel Basin Watermaster

Bench and small-scale pilot testing was conducted to determine the effectiveness of different conventional ion exchange resins for the removal of perchlorate in drinking water. The Main San Gabriel Basin Watermaster and Montgomery Watson issued a test report on April 6, 1999. Bench scale tests were performed using groundwater from the City of Azusa's well #9. Bench scale tests were used to test 3 ion exchange resins and to select the test conditions for the pilot testing. Test results indicate that polystyrene resins have a high affinity for perchlorate but are difficult to regenerate with a standard salt solution. Test results indicate that polyacrylic resins have a low to moderate affinity for perchlorate, but are easier to regenerate with a standard salt solution.

Biological Treatment Testing Sponsored by Aerojet

Aerojet is negotiating with the City of La Puente to pilot test the biological treatment process at this site. This work is being done in conjunction with the Baldwin Park Operable Unit Steering Committee and the Main San Gabriel Basin Watermaster. Please note that additional process steps would be required following the biological process in applications where the treated water is used directly for drinking water. These processes might include multi-media filters and granular activated carbon.

Construction of a full-scale biological facility in Sacramento is nearly complete. The treated effluent from the Sacramento facility is recharged to ground.

American Water Works Association Research Foundation (AWWARF) - Perchlorate Research Projects

The AWWARF awarded eight perchlorate related research contracts in 1998. The principle investigators for these projects submitted quarterly reports to the AWWARF in July 1999, however, these reports are not available to the public at this time. Six of the eight research teams will be presenting papers on their projects as part of the AWWA Inorganics conference to be held in February 2000.

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American Chemical Society Symposium

The 218th American Chemical Society (ACS) National Meeting occurred on August 22-26, 1999, in New Orleans. Under direction from the EPA, all the papers presented at the conference on perchlorate will be published in a book. Paper submittals are due on September 20, 1999, and the book will be released later this year.

4.0 Water Supply Contingency Options

4.1 City of Riverside

The City of Riverside continues to manage perchlorate via blending, maintaining concentrations below the provisional action level.

4.2 City of Loma Linda

Lockheed Martin continues to support the City of Loma Linda staff in developing blending plans, as necessary, to maintain the perchlorate concentration below the provisional action level. COLL Mountain View #2 production well has been operating under a blending plan since November 1998. A blending plan for COLL Richardson #2 production well was approved by DHS on May 18, 1999, and was implemented on June 28, 1999.

Connections to the adjacent water distribution systems of the City of Redlands (COR) and Loma Linda University (LLU) are being pursued as contingency water supply sources, should the COLL system be unable to meet peak water demand before the replacement production wells come online. Please note that a connection to the COSB water system already exists and COLL and COSB have a water transfer agreement.

Drilling of a new water supply well for the City of Loma Linda was completed this reporting period on City of Loma Linda property near the location of the former well, Mountain View #1. The replacement well is named Mountain View #3. Additional detail on the well installation will be provided to the Regional Board in the DHS permit application for use of the well as water supply.

Drilling began this reporting period for installation of a new water supply well for the City of Loma Linda (Richardson #4). The new well is located on Gould Street approximately 400 feet west of Richardson Street on property currently owned by the City of San Bernardino. Transfer of this property from the City of San Bernardino to the City of Loma Linda is in progress.

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4.3 Victoria Farms

Lockheed Martin continues to negotiate with Victoria Farms to resolve issues relating to the draft (July 1997) Water Supply Contingency Agreement. Victoria Farms currently receives water from the City of San Bernardino under a temporary water supply agreement. Lockheed Martin is reimbursing Victoria Farms for the incremental cost of the imported water.

4.4 City of Redlands

The City of Redlands is avoiding perchlorate through the active management of their surface water and groundwater resources.

4.5 Mountain View Power Company (formerly Southern California Edison)

No perchlorate has been detected in the Mountain View Power Company wells. The Mountain View Power Company plans to increase pumping at wells SCE Nos. 1 and 2 for cooling water purposes.

4.6 Loma Linda University

Sampling of the Loma Linda University wells resumed when their wells came back into service in March 1999. Perchlorate was not detected above the provisional action level.

5.0 Perchlorate Study Group

The Perchlorate Study Group (PSG) continues to provide financial support for ongoing toxicology research on perchlorate. As they are completed, the results of these studies are being forwarded to the Interagency Perchlorate Steering Committee, which includes members from the U.S. EPA and California EPA.

In cooperation with the PSG, the U.S. EPA, and the United States Air Force, Lockheed Martin is coordinating a multiple lab test of numerous chemical fertilizers for the presence of perchlorate in 1999.

We understand that the draft "reference dose" for perchlorate (published in December 1998) will be assessed in a second external peer review to be scheduled by the U.S. EPA. The U.S. EPA is currently reviewing toxicological results from several existing and some follow-up studies to determine if the current reference dose (equivalent to 32 ppb in drinking water) should be finalized or revised.

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The next quarterly update will be submitted in December 1999. If you have any questions, please contact me at (818) 847-0197 or Mr. Tom Blackman at (818) 847-0791.

Sincerely,



Carol A. Yuge

cc: See attached distribution list

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